

Phantom spiders: notes on dubious spider species from Europe

Rainer Breitling, Martin Lemke, Tobias Bauer, Michael Hohner, Arno Grabolle & Theo Blick

doi: 10.5431/aramit5010

Abstract. A surprisingly large number of European spider species have never been reliably rediscovered since their first description many decades ago. Most of these are probably synonymous with other species or unidentifiable, due to insufficient descriptions or missing type material. Here we discuss about 50 of these cases, declare some names as nomina dubia and establish the following new or re-confirmed synonymies: *Agelena mengeella* Strand, 1942 = *Allagelena gracilens* (C. L. Koch, 1841) **syn. conf.**; *Anyphaena accentuata obscura* (Sundevall, 1831) = *Anyphaena accentuata* (Walckenaer, 1802) **syn. conf.**; *Anyphaena accentuata obscura* Lebert, 1877 = *Anyphaena accentuata* (Walckenaer, 1802) **syn. nov.**; *Araneus diadematus stellatus* C. L. Koch, 1836 = *Araneus diadematus* Clerck, 1757 **syn. nov.**; *Araneus diadematus islandicus* (Strand, 1906) = *Araneus diadematus* Clerck, 1757 **syn. nov.**; *Araneus quadratus minimus* Simon, 1929 = *Araneus quadratus* Clerck, 1757 **syn. nov.**; *Araneus quadratus subviridis* (Franganillo, 1913) = *Araneus quadratus* Clerck, 1757 **syn. nov.**; *Centromerus unctus* (L. Koch, 1870) = *Leptorhoptrum robustum* (Westring, 1851) **syn. nov.**; *Clubiona caliginosa* Simon, 1932 = *Clubiona germanica* Thorell, 1871 **syn. nov.**; *Coelotes atropos anomalus* Hull, 1955 = *Coelotes atropos* (Walckenaer, 1830) **syn. nov.**; *Coelotes atropos silvestris* Hull, 1955 = *Coelotes atropos* (Walckenaer, 1830) **syn. nov.**; *Coelotes obesus* Simon, 1875 = *Pireneitega pyrenaica* (Simon, 1870) **syn. conf.**; *Coelotes simoni* Strand, 1907 = *Coelotes solitarius* (L. Koch, 1868) **syn. nov.**; *Diplocephalus semiglobosus* (Westring, 1861) **nomen oblitum** = *Entelecara congenera* (O. P.-Cambridge, 1879) **syn. nov.**; *Drassodes voighti* (Bösenberg, 1899) = *Scotophaeus blackwalli* (Thorell, 1871) **syn. conf.**; *Erigone decens* Thorell, 1871 = *Hylyphantes graminicola* (Sundevall, 1830) **syn. nov.**; *Liocranoeca striata gracilior* (Kulczyński, 1898) = *Liocranoeca striata* (Kulczyński, 1882) **syn. conf.**; *Phlegra rogenhoferi* (Simon, 1868) = *Phlegra cinereofasciata* (Simon, 1868) **syn. nov.**; *Styloctetor stativus* (Simon, 1881) = *Styloctetor compar* (Westring, 1861) **syn. nov.** and **comb. nov.**; *Tapinocyba bilacunata* (L. Koch, 1881) = *Silometopus incurvatus* (O. P.-Cambridge, 1873) **syn. nov.**; *Theridion varians melanotum* Strand, 1907 = *Theridion varians* Hahn, 1833 **syn. nov.**; *Thomisus trigonus* Giebel, 1869 = *Pistius truncatus* (Pallas, 1772) **syn. nov.**; *Titanoeca psammophila* Wunderlich, 1993 = *Titanoeca spominima* (Taczanowski, 1866) **syn. nov.** and **comb. nov.**; *Xysticus paniscus* L. Koch, 1875 = *Xysticus lineatus* (Westring, 1851) **syn. conf.**

Keywords: Araneae, doubtful species, new synonyms, nomen dubium, species inquirendae

Zusammenfassung. Phantomspinnen: Bemerkungen zu zweifelhaften Spinnenarten aus Europa. Eine überraschende Anzahl von europäischen Spinnenarten wurde seit ihrer Erstbeschreibung nie mehr zuverlässig wiedergefunden. In den meisten Fällen handelt es sich vermutlich um Synonyme anderer Arten oder die Arten bleiben aufgrund von unzulänglichen Beschreibungen und verlorenem Typusmaterial unidentifizierbar. Hier besprechen wir etwa 50 dieser Fälle, erklären zahlreiche Namen zu nomina dubia und identifizieren eine Reihe von neuen oder bisher übersehenen Synonymien.

A surprising number of spider species listed as valid on the European checklists and databases (e.g., van Helsdingen 2014, World Spider Catalog 2015, Nentwig et al. 2015) have never been reliably rediscovered after their initial description. Most of these

are probably nomina dubia, unidentifiable on the basis of the original descriptions, but to conclusively determine the status of these species, a careful examination of each individual case is necessary (van Helsdingen 2004). The status of some of these species has been clarified as part of larger revisionary work or in isolated papers (e.g., Kronstedt 2000, van Helsdingen 2008). An extended discussion of dubious species described by Bösenberg was also provided by Braun (1982), but many cases still remain to be examined.

The Working Group “Forum and Wiki” of the Arachnologische Gesellschaft (Lemke et al. 2014) has recently started an online project documenting the information available on suspected “phantom spiders”, with an initial focus on species from Central Europe.

Rainer BREITLING, Faculty of Life Sciences, University of Manchester, Manchester M1 7DN, UK; E-Mail: rainer.breitling@manchester.ac.uk

Martin LEMKE, Wakenitzmauer 23, 23552 Lübeck, Germany;

E-Mail: spinnen@martin-lemke.net

Tobias BAUER, Hattenbachweg 12, 70599 Stuttgart, Germany;

E-Mail: tobias_bauer@hotmail.de

Michael HOHNER, Juvenellstr. 26, 90419 Nürnberg, Germany;

E-Mail: arages@mhohner.de

Arno GRABOLLE, Am Horn 13b, 99425 Weimar, Germany;

E-Mail: arnogradolle@gmx.de

Theo BLICK, Heidloh 8, 95503 Hummeltal, Germany; E-Mail: info@theo-

blick.de; Senckenberg Research, Strict Forest Reserves, 60325 Frankfurt am Main, Germany; E-Mail: theo.blick@senckenberg.de

submitted 15.4.2015, accepted 28.7.2015, online 12.8.2015

The curators of the following collections were contacted to trace possible type material: BMNH = British Museum of Natural History (including large parts of the L. Koch collection, Jan Beccaloni), MfN = Museum für Naturkunde, Berlin (Dahl collection, Jason Dunlop), NMB = Naturhistorisches Museum Basel (Schenkel collection, Ambros Hänggi), NRS = Naturhistoriska riksmuseet Stockholm (parts of the Thorell collection, including Westring material, Torbjörn Kronstedt), NSMW = Naturhistorische Sammlungen Museum Wiesbaden (Zimmermann collection, Fritz Geller-Grimm), OUM = Oxford University Museum (Pickard-Cambridge collection, Zoë Simmons), SMF = Senckenberg Museum Frankfurt (Braun and Wunderlich collections, Peter Jäger), ZMH = Zoologisches Museum Hamburg (parts of the Bösenberg collection, including Bertkau material, Kai Schütte), ZMW = Zoological Museum Warsaw (Kulczyński and Taczanowski collections, Dominika Mierzwa-Szymkowiak), ZSH = Zoologische Sammlung der Martin-Luther-Universität, Halle (Giebel collection, Karla Schneider & Joachim Händel).

Some of the most important collections in this context are known to be lost, including those of Menge (formerly in the Provincial Museum Gdansk, but probably lost at the end of World War II; Kraus 2009), Lebert (formerly perhaps in Zurich or Wrocław, where it could not be found; Hänggi pers. comm.) and Bösenberg (formerly in the Königliches Naturalienkabinett in Stuttgart, but destroyed during a bombing raid on September 12th, 1944; Renner 1988). In this paper, we summarize the results for a selection of species for which the type specimens have been located and examined, or where they are in all probability lost. We also synonymise a number of subspecies with their nominate form, if they were originally described as sympatric (or even syntopic) variations and thus cannot be considered as subspecies in the modern sense. More detailed supporting information, including all original descriptions and figures, is available on the associated Wiki page (<http://wiki.spinnen-forum.de/index.php?title=Phantomarten>).

Species accounts in alphabetical order

Aelurillus simoni (Lebert, 1877) = **nomen dubium** (Salticidae)

The original description was based on three adult females and a male (Lebert 1877: 310, pl. 6, f. 45-47; as *Aelurops simoni*). L. Koch, who had seen the

types, stated (in Lebert 1877) that the species was new and occurred not only at the type locality in Switzerland, but also in South Tyrol (Italy). The type locality at an altitude of 1280 m indicates that this may be a montane or alpine species, such as *Pellenes lapponicus* (Sundevall, 1833), which shows suggestive similarities in the genitalia, but this remains speculative. Neither the illustration of the palpus, which is apparently shown in expanded state, nor the very schematic figure of the epigyne, nor the extensive description seem sufficient to allow a confident identification of this species. The type material is probably lost (see Introduction).

Agelena mengeella Strand, 1942 = *Allagelena gracilens* (C. L. Koch, 1841) **syn. conf.** – syn. nov. in Bonnet (1955) (Agelenidae)

This species was first described by Menge (1871: 285, pl. 52, f. 165) as *Agalena brunea*, matching a species similar to *Allagelena gracilens* to egg sacs similar to those of *Agroeca brunnea* (Blackwall, 1833). Strand (1942) noticed the error and proposed the new name *A. mengeella*; however, he did not examine the type material and was uncertain about the actual identity of the species, although he realized that it is most likely that Menge's specimens belonged to either *Allagelena gracilens* or *Agelena labyrinthica*. These two species were commonly confused at the time, but the illustrated pedipalp and epigyne both support an identification with the former, and Menge himself had already pointed out the similarity – his misidentification was apparently only based on the wrongly assigned egg sacs. Against Strand (1942), and in agreement with Bonnet (1955), we therefore conclude that even in the absence of the type material the synonymy of the two species can be established with confidence. This is also in agreement with Prószyński & Starega (1971), who also synonymized *A. brunea* with *A. gracilens*, following the use of the name by several earlier Polish authors.

Agelena mengei Lebert, 1877 = **nomen dubium** (Agelenidae)

Lebert's description of a female is very extensive, but does not allow an unambiguous identification (Lebert 1877: 211, pl. 6, f. 42). The most likely candidate would seem to be *Agelena labyrinthica*, which matches the description and illustration very well; however, Lebert reports *A. labyrinthica* from many locations, and insists that this specimen belongs to a

different species, although the only diagnostic difference explicitly mentioned seems to be a slight variation in body proportions. Possibly the species could even be a member of *Tegenaria* s. lat.

Agyreta resima (L. Koch, 1881) = **nomen dubium (Linyphiidae)**

This species was described in the genus *Erigone* (Koch 1881: 50, pl. 2, f. 4), which at that time included a large part of the small Linyphiidae, but the similarity with *Agyreta rurestris* (C. L. Koch, 1836) discussed in the original description justifies the transfer to *Agyreta*. A more precise identification seems, however, impossible, based on the very vague illustrations and textual description. The type material seems to be lost (not in BMNH). *A. resima* is one of several dubious species included by Roewer (1928) in his key of German spiders. He even added additional details on the habitat and phenology of the species, although the source of this information is unclear. The popularity and easy accessibility of Roewer's work is most likely responsible for reports of the species from Cieszyn in South Poland (Książkówna 1936), as well as for the notorious "Balkan rediscoveries" of many of the species discussed here (see Braun 1982 for details).

Amaurobius spominimus Taczanowski, 1866 = *Titanoeca psammophila* Wunderlich, 1993 = *Titanoeca spominima* (Taczanowski, 1866) **syn. nov. and comb. nov. (Titanocidae)**

This species was described by Taczanowski without figures and with a very short description of less than 3 lines (Taczanowski 1866: 4), and the type material appears to be lost (not in ZMW). It would thus seem an obvious candidate for being a nomen dubium. However, the short description, which is based on specimens collected in the dunes of Praga and Dąbrowa close to Warsaw, mentions a number of distinguishing characters that allow a confident identification: "Prosoma reddish-brown; opisthosoma short, rounded, hairy, black; legs reddish-black hairy; length: female 4 mm. About 10 specimens collected in sand under a lawn of reindeer lichen (*Cladonia*)". Of all cribellate species in the area, only *Titanoeca psammophila* shares these characters (*Titanoeca* species were often placed in *Amaurobius* at the time of Taczanowski's work). *T. psammophila* was long confused with *Titanoeca quadriguttata* (Hahn, 1833), but is distinguished from this and other Central European *Titanoeca* species by the combination of a lack

of white spots, the smaller size and the psammophilous (not titanophilous) habitat. The large number of specimens examined by Taczanowski makes it unlikely that the specimen was an unusually small or dark form of another species. Even though the description only mentions the size of a female specimen (perhaps because it was particularly large), there is no indication that only females were found, and the striking white spots of males (and most subadult males) of related species would not have escaped Taczanowski's attention. Braun (1969) had mentioned *T. psammophila* as a "melanistic and nanistic form" of *T. quadriguttata* from the Mainzer Sand (SMF 20769/15119, examined by TB). Other records are known from southern Sweden (Öland, Östergötland, Stockholm) and Finland (Åboland), from the dunes north-east of Berlin (Pimpinellenberg), from sandy meadows in the South of the Czech Republic (Hodonín area), and neighbouring regions of Slovakia (Lakšárska Nová Ves), from South Hungary (Kiskunság National Park), from the Perm Region in the easternmost part of the European part of Russia, and in Poland from Biebrza National Park, 200 km north-east of Warsaw (Kupryjanowicz 1997a, Jakobitz & Broen 2001, Gajdoš & Majzlan 2005, Esyunin 2006, Gallé & Fehér 2006, Kronstedt 2010, Hula et al. 2014). Thus, although no recent records of *T. psammophila* are known from the Warsaw area, the locus typicus of *A. spominimus* is located in the epicentre of the known distribution and consists of very typical habitat. As *T. psammophila* was only described quite recently and has been very rarely reported, the name is not protected by prevailing usage, and the older synonym takes priority as *Titanoeca spominima*.

Anyphaena accentuata obscura (Sundevall, 1831) = *Anyphaena accentuata* (Walckenaer, 1802) **syn. conf. – syn. nov. in Sundevall (1833) (Anyphaenidae)**

Anyphaena accentuata obscura Lebert, 1877 = *Anyphaena accentuata* (Walckenaer, 1802) **syn. nov.**

Anyphaena sabina Bertkau, 1880 (**misidentification**) = *Anyphaena furva* Miller, 1967

Anyphaena accentuata obscura Bertkau (in Förster & Bertkau 1883) (**misidentification**, not *A. a. o.* Lebert, 1877) = *Anyphaena furva* Miller, 1967

Anyphaena obscura Bösenberg, 1902 (**misidentification**, not *A. a. o.* Lebert, 1877) = *Anyphaena furva* Miller, 1967

The name *obscura* was first used by Sundevall for a specimen similar to *Tegenaria domestica* (Sundevall

1831: 21, sub *Agelena obscura*), but already two years later he realized that this specimen was an old female of *Anyphaena accentuata*, in which the characteristic markings of the opisthosoma had been obliterated (Sundevall 1833: 265, 269). The name was later used independently by Lebert (1877: 242) for a dark variety (“Spielart”) of *A. accentuata*, without reference to Sundevall and without the intention to establish a subspecies in the modern sense. Bertkau (in Förster & Bertkau 1883: 210) uses Lebert’s name for the males of a dark species of *Anyphaena* found in Bonn, Germany. This species is, however, clearly distinct from *A. accentuata*, as can be seen from the illustration of the male pedipalp provided by Bösenberg (1902: 258, pl. 24, f. 373) based on Bertkau’s material (now lost; Braun 1982). It seems very likely that these specimens actually belonged to *A. furva*, a rare species of *Anyphaena*. Although the tibial apophysis as illustrated by Bösenberg is certainly exaggerated, it is sufficiently similar to that of *A. furva*, which is broader and more massive (“breiter und plumper”) than that of *A. accentuata* (Miller 1967). Also, the lack of ventral spines at the base of the pedipalpal femur, the more uniform dorsal hairs on the pedipalpal tibia, and the more cylindrical (rather than anteriorly broadened) shape of the tibia are clearly visible in comparison to the figures of *A. accentuata* on the same plate and match the diagnostic features of *A. furva* (Miller 1967). Moreover, *A. furva* is regularly found as almost black specimens (Bauchhenss 2009). No other European species of *Anyphaena* matches the description of Bertkau’s specimens. Bertkau (1880: 253) had originally reported his specimens as *A. sabina*, but had changed his opinion after a male had been examined by Simon, and the shape of the pedipalpal tibia certainly excludes this identification. *A. furva* is found in xerothermic habitats and would be another example of a distinctly thermophilic element reported by Bertkau for the Bonn area. Other thermophilous species, often with Ponto-Mediterranean affinities, found by Bertkau around Bonn include, e.g., *Cetonana laticeps*, *Sagana rutilans*, *Euryopis quinqueguttata*, *Heriacus graminicola* (sub *Heriacus hirtus* in Braun 1960), *Pellenes nigrociliatus*, *Philaeus chrysops*, and *Saitis barbipes* (Bertkau 1880, Bösenberg 1903, Braun 1960). Therefore, his discovery of *A. furva*, which extends the known area of this rarely reported species by several hundred kilometres to the west, is not all that surprising.

Araneus diadematus stellatus C. L. Koch, 1836 = *Araneus diadematus* Clerck, 1757 **syn. nov. (Araneidae)**
Araneus diadematus islandicus (Strand, 1906) = *Araneus diadematus* Clerck, 1757 **syn. nov.**

Araneus quadratus minimus (Gétaz, 1889) = **nomen nudum**

Araneus quadratus minimus Simon, 1929 = *Araneus quadratus* Clerck, 1757 **syn. nov.**

Araneus quadratus subviridis (Franganillo, 1913) = *Araneus quadratus* Clerck, 1757 **syn. nov.**

The name *Araneus quadratus minimus* was first used by Gétaz (1889: 60; sub *Epeira quadrata*, var. *minima*) in a list of spiders from Pays-d’Enhaut (canton Vaud, Switzerland), but without any description. A description was only provided forty years later by Simon (1929: 683), who must therefore be regarded as the valid author of this taxon. *A. q. minimus* was the only named variety of *A. quadratus* Simon maintained in his Arachnides de France, reporting it as a local montane form, found on dwarf shrubs of alpine meadows; it is thus not a subspecies in the modern sense. Similar melanistic specimens are typical for boreoalpine populations of *Araneus diadematus* as well (e.g., var. *islandicus* Strand, 1906, and var. *stellatus* C. L. Koch, 1836, both of which would not be considered subspecies in the modern sense, and have to be treated as synonyms of the nominate form). The synonymy for var. *stellatus* was already proposed by Thorell (1870) and Lessert (1910), but not accepted by all later authors (e.g., Simon 1929).

Another montane form of *Araneus quadratus* was reported by Franganillo from Spain (Franganillo 1913: 127), where he found female specimens in their silken retreats “in gorse and low shrubs on the slopes of the mountains” in the surroundings of Gijón or La Guardia. From the description it is clear that this greenish form of the species (“with four strikingly visible spots”) was never intended as a subspecies in the modern sense, and it was never used as such by Franganillo, who describes it as a variety only. *A. quadratus* has been reported as being able to actively change its colour (Bunn 1957), and the features of the epigyne (“scapus large and bent upwards, as in *Epeira trifolium* Hentz”, referring to a lateral view of the epigyne illustrated in Emerton 1884) also seem to fall within the normal variation of *A. quadratus*.

Araniella silesiaca (Fickert, 1876) = **nomen dubium (Araneidae)**

The status of this species, which had been first described as *Epeira s.* based on a female specimen from

the environs of Wrocław (Fickert 1876: 70), was examined in detail by Blanke (1982), who concluded that the species cannot be unambiguously recognized based on the original description. While many authors have identified the species as *Araniella alpica* (L. Koch, 1869), the existence of highly similar forms, including the sister species *A. inconspicua* (Simon, 1874), precludes a confident assignment to this species. The original types are very likely to be lost.

Bathypantes enslini Strand, 1910 = **nomen dubium (Linyphiidae)**

This species was described by Strand (1910: 48) from a juvenile and poorly preserved specimen found in a cave in Franconia, Germany. The types are most likely lost (not in MfN), and even if they were rediscovered, a confident identification would be close to impossible.

Centromerus ludovici Bösenberg, 1899 = **nomen dubium (Linyphiidae)**

The type material of this species described by Bösenberg (1899: 115, pl. 1, f. 2) was destroyed during World War II (Renner 1988), like many of Bösenberg's types. Wunderlich (1973) and Braun (1982) consider the species as a member of what is now the genus *Agyneta*, but agree that a more precise identification is impossible.

Centromerus unctus (L. Koch, 1870) = *Leptorhoptum robustum* (Westring, 1851) **syn. nov. (Linyphiidae)**

The original description by Koch (1870: 24, sub *Erigone uncta*) already doubted the validity of this species and pointed out the close similarity to *Erigone huthwaitii* (O. P.-Cambridge, 1861) (= *L. robustum*). The mentioned diagnostic characters do not allow a discrimination from this species, and Koch mentions that any observed differences could easily be explained by the commonly observed expansion of the palpal organs. Even though the type material seems to be lost, the synonymy seems justified, considering the highly distinct male genitalia of *L. robustum* and the fact that it is the sole member of its monotypic genus.

Clubiona caliginosa Simon, 1932 = *Clubiona germanica* Thorell, 1871 **syn. nov. (Clubionidae)**

The name *C. caliginosa* was introduced by Simon (1932: 965) for the female of a species originally considered by Koch (1867: 311) as *Clubiona holosericea* De Geer (= *Clubiona phragmitis* C. L. Koch,

1843). Koch's mistake was first noticed by Thorell (1871), who redescribed the species under the new name *Clubiona germanica*. Simon, however, felt that the males and females illustrated by Koch did not belong to the same species and introduced another new name for the latter. The justification for this move is unsatisfactory: the (admittedly crude) illustration of the epigyne provided by Koch does certainly show sufficient similarity with that of *C. germanica*, and nothing in Koch's description argues against this identification. The collection O. Pickard-Cambridge in the Oxford University Museum of Natural History contains specimens of *C. holosericea* from Nuremberg labelled as types (Bottle 281.9); these are most likely the material underlying Thorell's description of *C. germanica*. The type of *C. caliginosa*, however, is the illustration of the epigyne published by Koch.

Coelotes atropos anomalus Hull, 1955 = *Coelotes atropos* (Walckenaer, 1830) **syn. nov. (Agelenidae)**

Coelotes atropos silvestris Hull, 1955 = *Coelotes atropos* (Walckenaer, 1830) **syn. nov.**

The two "varieties" described by Hull were always found together with the typical forms; they are not subspecies as currently understood, but rather individual variants of a single, highly variable species (types not in BMNH).

Coelotes obesus Simon, 1875 = *Pireneitega pyrenaica* (Simon, 1870) **syn. conf. – syn. nov. in Simon (1937) (Agelenidae)**

This synonymy was already recognized by Simon (1937: 1034), but overlooked in subsequent catalogues.

Coelotes simoni Strand, 1907 = *Coelotes solitarius* (L. Koch, 1868) **syn. nov. (Agelenidae)**

C. simoni was suggested as a new name for a specimen of *C. solitarius* illustrated by Simon (1898: 173, f. B), which Strand (1907: 392) considered misidentified, without examination of the original material and without any further explanation. There is no indication that Strand's decision was justified, given that Simon was well acquainted with *C. solitarius*, as shown by numerous records of the species in the Arachnides de France.

Diplocephalus semiglobosus (Westring, 1861) **nomen oblitum = Entelecara congenera** (O. P.-Cambridge, 1879) **syn. nov. (Linyphiidae)**

The type of this species, which was described as very similar to *Entelecara acuminata* (Wider, 1834) and *Diplocephalus picinus* (Blackwall, 1841) (Westring 1861: 235; sub *Erigone semiglobosa*), is preserved in Thorell's collection in the NRS. It was originally kept in dried state on a pin, and transferred into alcohol by Åke Holm, who also studied the specimen and discovered the synonymy with *E. congenera*, as recorded on a label he added to the vial (Kronstedt pers. comm.). *D. semiglobosus* is the senior synonym, but it has not been used as a valid name after 1899; to our knowledge, it only occurs in general catalogues, which should be considered mere nomenclators according to article 23.9.6 of the International Code of Zoological Nomenclature. In contrast, the junior synonym *E. congenera* has been in general use for the last 100 years, being used by far more than 25 works by more than 10 authors in the last 50 years (for example, Miller 1971, Klomp & Teerink 1973, Lockett et al. 1974, Punda 1975, Albert 1979, Bauchhenss et al. 1987, Roberts 1987, Baehr 1988, Blick & Scheidler 1991, Hauge & Hansen 1991, Heimer & Nentwig 1991, Braun 1992, Schultz 1992, Millidge 1993, Albrecht 1995, Finch 1997, Hermann 1998, Svatoň & Pridavka 2000, Tutelaers 2000, Harvey et al. 2002, Ratschker et al. 2005, Van Keer & Van Keer 2005, De Koninck 2006, Otto & Floren 2007, Russell-Smith 2011, Wunderlich 2011, Staudt et al. 2012, Kostanjšek & Kuntner 2015). Therefore, we propose that *Diplocephalus semiglobosus* (Westring, 1861) is considered as **nomen oblitum**, and that *Entelecara congenera* (O. P.-Cambridge, 1879) is valid as **nomen protectum** according to article 23.9 of the International Code of Zoological Nomenclature.

Drassodes myogaster (Bertkau, 1880) = **nomen dubium (Gnaphosidae)**

This species, described as *Drassus m.* based on a single female from Bonn (collected at exactly the same location as *Anyphaena accentuata obscura*), was repeatedly synonymized with *Drassodes lapidosus* (Walckenaer, 1802) (e.g., by Reimoser 1937, Grimm 1985). This is, however, dubious, considering not only the presence of the morphologically all but indistinguishable sister species *D. cupreus* in the same area, but also the fact that Bertkau did describe *D. lapidosus* in the same paper, and saw closer similarities of *D. myogaster* with *D. pubescens*, *D. luteomicans* (sub *D. portator*), *D. rubidus* and *D. villosus*. As the type material is apparently lost, no reliable identification of the species is possible.

Drassodes voighti (Bösenberg, 1899) = *Scotophaeus blackwalli* (Thorell, 1871) **syn. conf.** – syn. nov. in Grimm (1985) (**Gnaphosidae**)

The species, described as *Drassus voightii*, was initially synonymized with *Drassodes villosus* (Thorell, 1856) (Reimoser 1937). Only the discovery of a putative female syntype (paratypoid) in Bösenberg's collection in the Zoological Museum Hamburg by Grimm (1985) revealed that the species is synonymous with *Scotophaeus blackwalli*. In retrospect, this matches Bösenberg's illustration of the epigyne quite well (Fig. 1), and the type locality in the inner city of Bonn also agrees with the synanthropic habits of *S. blackwalli* in Central Europe (Grimm 1985; Roberts 1998). Incidentally, this case illustrates that the declaration of taxa as nomina dubia will always be tentative; an initial careful revision of Bösenberg's

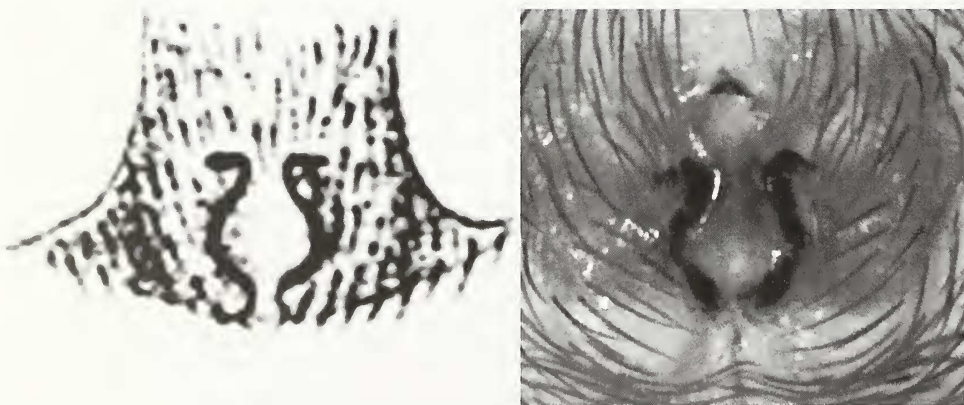


Fig. 1: Comparison of the original illustration of *Drassodes voighti* (Bösenberg, 1899: pl. 1, f. 5) and the epigyne of *Scotophaeus blackwalli* (Thorell, 1871), showing an excellent agreement in overall shape and proportions (photo by Arno Grabolle)

collection by Braun (1982) failed to discover the type and concluded that *D. voighti* was a nomen dubium (“dubiose Art”).

Erigone decens Thorell, 1871 = *Hylyphantes graminicola* (Sundevall, 1830) **syn. nov. (Linyphiidae)**

This species was described in a footnote to the discussion of *Erigone dentifera* (= *H. graminicola*), based on a male specimen that Thorell could “scarcely distinguish from *E. dentifera*” (Thorell 1871: 128). The type specimen is preserved in Thorell’s collection in the Naturhistoriska riksmuseet, Stockholm; its examination by Åke Holm revealed that it is a gynandromorphous specimen of *H. graminicola* with fully formed epigyne and typical male pedipalps (Kronstedt pers. comm.).

Euophrys striolata (C. L. Koch, 1846) = **nomen dubium (Salticidae)**

This species, first described based on a poorly preserved female from near “Carlsbad in Böhmen”, which is now Karlovy Vary in the Czech Republic (Koch 1846: 47-48, f. 1306), is similar to *Euophrys frontalis* and *E. terrestris*. This is one of the few species described by C. L. Koch that Simon (1864) lists as “species invisā” in his revision of European Salticidae, so presumably the type was already lost by then. The description and figure do not allow an unambiguous identification, beyond the fact that this is almost certainly the synonym of a common species (Bonnet 1955).

Gonatium fuscum Bösenberg, 1902 = **nomen dubium (Linyphiidae)**

Gonatium gilbum Bösenberg, 1902 = **nomen dubium**

Gonatium pallidum Bösenberg, 1902 = **nomen dubium**

The type material of these species was destroyed in World War II (Renner 1988). The descriptions do not allow an unambiguous identification. Despite a number of tentative identifications in the literature, an unambiguous identification is impossible in all cases (Braun 1982). All reported specimens from Eastern and Southern Europe that could be examined turned out to belong to well-known species (Braun 1982).

Gongyliidiellum compar (Westring, 1861) = *Styloctetor stativus* (Simon, 1881) = *Styloctetor compar* (Westring, 1861) **syn. nov. and comb. nov. (Linyphiidae)**

The holotype of *Erigone compar*, a single dried male and pedipalp in the collection of the Naturhistoriska riksmuseet, Stockholm, was examined in 1942 by Åke Holm, who added a corresponding identification label to the specimen (Kronstedt pers. comm.). He identified the specimen as belonging to *Styloctetor stativus*. Westring’s name is the senior synonym, and as it has been used repeatedly since 1899, due to a mistaken synonymization of *G. compar* and *G. latebricola* (sensu Simon) by Hull (1932), the older name cannot be considered as a nomen oblitum according to article 23.9 of the International Code of Zoological Nomenclature. Even though *S. stativus* has been very widely used in the last 100 years, and its replacement by the senior synonym will be inconvenient, it does not seem justified to appeal to the International Commission on Zoological Nomenclature requesting a ruling under the plenary power to suppress the older synonym. Thus, we suggest that *Styloctetor compar* (Westring, 1861) should be considered the valid name for the species.

Leptyphantes beckeri Wunderlich, 1973 = **nomen dubium (Linyphiidae)**

This species, in contrast to most of the species discussed here, has been found again after the original description. It turned out that all specimens found were parasitized females, and it is likely that they are malformed representatives of a common species (Harvey et al. 2002) belonging in the genus *Tenuiphantes*. The original description emphasizes the similarity in habitus to *T. mengei*, but Wunderlich (2008) stated that both *T. mengei* and *T. flavipes* were common at the type locality and considered *L. beckeri* a nomen dubium.

Leptyphantes thienemanni Schenkel, 1925 = **nomen dubium (Linyphiidae)**

The female type specimen is preserved in Schenkel’s collection in the Naturhistorisches Museum Basel; however, its epigyne is missing. The description emphasises the noticeably small and pale appearance of the epigyne as the main diagnostic character. This indicates that the specimen was probably a subadult female of a widespread and common species of *Leptyphantes* s. lat., especially as another four female specimens were later found in February, March and June in bogs in Northwest Germany by Peus (1928; material determined by Schenkel, but apparently lost, not in NMB).

Liocranoeca striata gracilior (Kulczyński, 1898) = *Liocranoeca striata* (Kulczyński, 1882) **syn. conf.** – syn. nov. in Simon (1932) (**Liocranidae**)

This taxon, described as *Agroeca gracilior*, which probably represents individual intraspecific variability, according to the original description is identical in genitalic structure to the nominate form. It was already synonymized by Simon (1932), and this decision was followed by most subsequent authors (e.g., Reimoser 1937, Bonnet 1955, Sterghiu 1985). The type material seems to be lost (not in ZMW).

Micrargus incomtus (O. P.-Cambridge, 1872) = **nomen dubium (Linyphiidae)**

The type material of this species seems to be missing in the collection O. Pickard-Cambridge in the Oxford University Museum of Natural History. The description, as *Erigone incomta*, compares the species to *Agyneta saxatilis* (Blackwall, 1844) and *Maso sundevalli* (Westring, 1851), but the form of the pedipalp, especially the long spiral embolus exclude a closer affinity with these species and instead support a placement in *Micrargus* Dahl, 1886. However, the typical prosomal grooves of the males of this genus are missing in the figures and description. In the absence of type material, the species remains unidentifiable.

Microneta iracunda (O. P.-Cambridge, 1879) = **nomen dubium (Linyphiidae)**

This species, described as *Neriene iracunda*, after a single male collected by Eugen Count Keyserling in "Lüvland" (present-day Latvia and Estonia), is described as being allied to *Agyneta subtilis* (O. P.-Cambridge, 1863), *A. conigera* (O. P.-Cambridge, 1863) and *A. innotabilis* (O. P.-Cambridge, 1863). Pickard-Cambridge was obviously quite familiar with this group, and it is very likely that the species should be placed in *Agyneta*. However, as the type material could not be found in the Pickard-Cambridge collection in Oxford, no reliable identification at the species level is possible.

Oedothorax insignis (Bösenberg, 1902) = **nomen dubium (Linyphiidae)**

Originally described in *Gonatium*, the species was transferred to *Oedothorax* (Bertkau, in Förster & Bertkau, 1883) by Wunderlich (1974), based on the similarity of the epigyne to that of species such as *Oedothorax retusus* and *Oedothorax apicatus*. Braun (1982) confirms that according to the epigyne the

species certainly belongs to *Oedothorax*, but also suggests a possible synonymy with *Dismodicus elevatus*, based on misidentified specimens from Romania (his reasoning in this case is not quite clear: there is no reason to assume that the Romanian specimens had been compared to authentic material). The type material was probably lost together with the other *Gonatium* types of Bösenberg (Renner 1988).

Oedothorax pallidus (Bösenberg, 1902) = **nomen dubium (Linyphiidae)**

This species was originally described in *Kulczynskielum* F. O. Pickard-Cambridge, 1895. Wunderlich (in Braun 1982) considered the species as belonging to *Oedothorax*, probably *O. retusus*, but Braun disagreed and suggested a possible identity with *Gongylidium rufipes* (Linnaeus, 1758) instead. The type material probably was lost together with most other linyphiid types of Bösenberg (Renner 1988), making a reliable identification impossible.

Oedothorax subniger (Bösenberg, 1902) = **nomen dubium (Linyphiidae)**

Suggested identifications for this species, described as *Kulczynskielum subnigrum*, have been *Gonatium rubens* (Blackwall, 1833) and *Hylyphantes graminicola* (Sundevall, 1830) (Braun 1982). However, as the type material probably was lost together with most other linyphiid types of Bösenberg (Renner 1988), a reliable identification is impossible.

Oedothorax tener (Bösenberg, 1902) = **nomen dubium (Linyphiidae)**

Another of Bösenberg's species. originally *Kulczynskielum tenerum*, for which the type material is lost (Renner 1988) and an identification based on the incomplete description is impossible. Even the generic assignment is uncertain and Wunderlich (1973) suggested a possible placement in *Tapinocyba* Simon, 1884. Nevertheless, the species, which was illustrated by Roewer (1928), has been reported from the Balkans (Drensky 1929, 1936).

Pardosa bernensis (Lebert, 1877) = **nomen dubium (Lycosidae)**

As the type of the species *Lycosa bernensis* is probably lost, no unambiguous identification of this species is possible. The two most likely candidates are *Acantholycosa pedestris* (Simon, 1876) and *Pyrenecosa rupicola* (Dufour, 1821), based on the size (12 mm

total length), the type locality in the Bernese limestone Alps, and the “strange” (“sonderbar”) habitus of the specimen: dark black, long-legged and almost without pattern. Both *A. pedestris* and *P. rupicola* are large, almost uniformly black species from the limestone Alps. The type locality (Kandersteg, canton Bern) is at the centre of the known distribution of the alpine population of *P. rupicola* and too far west for *A. pedestris* (Buchar & Thaler 1993), but an identification based solely on a zoogeographical argument seems tenuous. The other *Acantholycosa* species are more distinctly coloured, while the similarly built *Pardosa nigra* (C. L. Koch, 1834) is described in detail by Lebert and reported from numerous localities, thus can probably be excluded as an alternative synonym.

Pardosa intermedia (Bösenberg, 1903) = **nomen dubium (Lycosidae)**

Like many other types of Bösenberg, the material of this species, described as *Lycosa intermedia*, was destroyed in World War II (Renner 1988). In the original description, Bösenberg remarked that the species has an intermediate position between *Pardosa agrestis*, *Pardosa albatula*, *Pardosa monticola* and *Pardosa palustris*. Given the general difficulties of identifying females of the *monticola* group, it is impossible to identify the species solely based on the description and figures. In particular, an identification with *P. palustris* proposed by Simon (in Bösenberg 1903) and Bonnet (1958) seems unlikely, given the highly characteristic epigyne of that species and the fact that Kulczyński examined the type and considered it a new species. Possibly the epigyne of the specimen

was malformed due to parasitism, or the type was indeed a rare hybrid with intermediate characters (see Martin 2013 for a discussion of possible causes of genital malformations in *Pardosa*). *Pardosa* species are the most commonly known hosts of mermithid worms (Penney & Bennett 2006), and it seems likely that parasite-induced malformations are the basis for other phantom species in this genus as well.

Philodromus depriesteri Braun, 1965 = **nomen dubium (Philodromidae)**

This species, a member of the *Philodromus aureolus* group, was first described from two widely separated localities (Krimml, Austria, and Geisenheim, Germany), separated by 600 km including the German Alps. Nonetheless, despite its presumably extensive range and much increased collecting activities in the last decades, the species has never been found again since its description 50 years ago. The reason is probably that the two female types preserved in the Senckenberg Museum Frankfurt are malformed (or subadult) specimens with incompletely developed epigynes (Jäger pers. comm.). Vulval structures very similar to those of *P. depriesteri* were observed in a female *Philodromus* of the *aureolus* group that turned out to be infected by a parasitic worm (Mermithidae or Nematomorpha; Fig. 2). This specimen was collected by beating the field layer of a wet meadow, together with typical specimens of *Philodromus collinus*. It therefore seems very likely that the unusual genitalia are the result of a parasite-induced malformation, comparable to the case of *Lepthyphantes beckeri*. Nematode infections have been repeatedly described in spiders (Meyer 2014 and references therein), and



Fig. 2: Parasitized *Philodromus* female (left), collected in the Allgäu region, Bavaria, Germany, in August 2012. Its epigyne (centre, dorsal view) lacks receptacula and a fully developed median septum, just as seen in *P. depriesteri*, and during the genital preparation a parasitic worm (right) about 10 cm in length was detected. (Photographs courtesy of Stefan Rehfeldt)

it has been speculated before that they might be the cause of genital malformations (Martin 2013). Braun (1965) already recognized the possibility that his types were aberrant specimens, but nonetheless decided to describe them as a new species, even though the highly unusual genital morphology (lacking receptacula and median septum, which are otherwise uniformly present and distinct in all species of the group) would require a radically divergent pedipalp structure and mating behaviour, which is inconsistent with the general conservative trends within *Philodromus*. Such a dramatic divergence would be particularly unexpected as Braun identifies a clear “sister species”, *Philodromus collinus* C. L. Koch, 1835, which is highly similar in all non-genital characters. The reason for considering *P. depriesteri* as a nomen dubium, instead of a synonym of *P. collinus*, lies in the overall similarity of females in the *aureolus* group.

Philodromus dispar obscurus Lebert, 1877 = **nomen dubium (Philodromidae)**

This form was described by Lebert (1877: 271) as a melanistic variety of *P. dispar*, found in the Urserental, Switzerland, at an altitude of 1500 m. Later authors either ignored this variety or considered it a synonym of the nominate form (Lessert 1910). The description of *P. d. obscurus* is, however, impossible to reconcile with *P. dispar*: the male is described as having entirely dark brown legs with black margins (“mit ganz dunkelbraunen, schwarz berandeten Beinen”) and white-grey spots and a grey transverse band on the black opisthosoma. The female is even more different (“weicht besonders ab”), and is described as entirely dark, and larger and more massive than the nominate form. The alpine location suggests that Lebert may actually be describing dark specimens of *Philodromus vagulus* (Simon, 1875), a high-altitude species that is reasonably similar in general habitus to *P. dispar* and has a similarly elongated epigyne, but is darker, larger, and without distinct sexual dimorphism. However, the description is so vague and the number of remaining discrepancies so large that, in the absence of type material, it seems prudent to consider *P. dispar obscurus* as a nomen dubium.

Philodromus micans Menge, 1875 = **nomen dubium (Philodromidae)**

As for most of the species described by Menge, the type material of *P. micans* is probably lost (Kraus 2009). The form was originally described as a vari-

ety of *Philodromus aureolus*, and this seems indeed the most likely identification, based on the figures in both the original description and the later re-description by Bösenberg (1902). Bertkau (1880) had already considered *Philodromus micans* as the male of *P. aureolus*. However, given that Muster & Thaler (2004) tentatively assign the male illustrated by Bösenberg to the closely related *Philodromus buchari* Kubcová, 2004, it seems currently impossible to unambiguously identify Menge’s species.

Phlegra rogenhoferi (Simon, 1868) = *Phlegra cinereofasciata* (Simon, 1868) **syn. nov. (Salticidae)**

This species was described based on a single male collected by Octavius Pickard-Cambridge in Baden (close to Vienna, Austria) during a trip through Europe and probably passed on to Eugène Simon during his subsequent visit to Paris (Pickard-Cambridge 1918). According to Kulczyński (1898) the species is very close (and possibly identical) to *P. fuscipes* Kulczyński, 1891, currently considered a junior synonym of *P. cinereofasciata* (Simon, 1868). More recently, the species was discussed by Stefania Hęciak in her unpublished PhD thesis (Hęciak, ca. 1983), based on material from “Galicia Vallombrosa” (probably in Spain or possibly Italy) in the collection of the Muséum National d’Histoire Naturelle, Paris. However, it is unlikely that this material is part of the type series of *P. rogenhoferi*, and it quite possibly belongs to a different species. Despite Prószyński’s claim (2014) that “Simon’s 1937: 12661267 remark on occurrence [in Austria and once in Landes, France] must be wrong”, it is all but inconceivable that Simon, whose excellent memory was legendary (Savory 1961), would have confused material obtained from Pickard-Cambridge at the “summit meeting” of the Golden Age of arachnology. This interpretation is confirmed by the presence of a specimen from Baden in Pickard-Cambridge’s collection in Oxford (vial 1744.7); it is not clear if this is the type described by Simon, but the specimen certainly belongs to the same series. Geographical arguments support the identification of *P. rogenhoferi* with *P. cinereofasciata*. The latter is the only species of *Phlegra* sufficiently similar to the species described by Simon occurring in the wider vicinity of the type locality. Perhaps even more importantly, the first published record for Austria we are aware of came from a xerothermic hillside in easy walking distance of Baden (just 10 km to the north of Baden city centre; Franz

& Beier 1948), and recently published Austrian locations are in the same general area, only 50 km further east (Malicky 1972). Further records come from the Pálava Protected Landscape Area, Czech Republic, less than 100 km north of Baden (Bryja et al. 2005). We therefore suggest following Kulczyński's tentative proposal and accepting *P. rogenhoferi* as a synonym of *P. cinereofasciata* s. lat. as defined by Azarkina (2003). Should *P. cinereofasciata* require further subdivision, *P. rogenhoferi* would probably have to be considered a senior synonym of *P. fuscipes* Kulczyński (1891).

Sitticus exiguus (Bösenberg, 1903) = **nomen dubium**
(Salticidae)

The illustrated epigyne of the only specimen of this species (Bösenberg 1903: 427, pl. 41, f. 625, sub *Attus exiguus*) is similar to that of *Sitticus penicillatus* (Simon, 1875), which Bösenberg described in the section immediately following the description of *S. exiguus*. However, as the type material was destroyed in World War II (Renner 1988), a reliable identification is impossible, particularly as an alternative identification with *Heliophanus kochii* has even been suggested, indicating the insufficiency of the original description (Braun 1982).

Tapinocyba bilacunata (L. Koch, 1881) = *Silometopus incurvatus* (O. P.-Cambridge, 1873) **syn. nov.**
(Linyphiidae)

This species, described in *Erigone* from a single male specimen found close to the current border between Germany and Poland, can be provisionally identified as a junior synonym of *Silometopus incurvatus* based on the characteristic prosoma shape and tibial apophysis (Fig. 3), as well as details mentioned in the text of the description, such as the long, fine spiral of the embolus. *S. incurvatus* is very uncommon and often found in coastal regions and sandy grasslands and heathlands (Merkens 1999, Schmidt & Melber 2004); in Germany the species seems to have its distribution centre around the type locality of *T. bilacunata* (Staudt 2015). The only other similar species is *S. acutus* Holm, 1977, which Palmgren (1976) considered as probably a mere geographical race of *S. incurvatus*. In fact, the pointed tibial apophysis in Koch's figure, as well as the distinct cephalic pit mentioned in the description, might argue for a synonymy with the form described by Holm. In contrast to *S. incurvatus*, *S. acutus* has never been

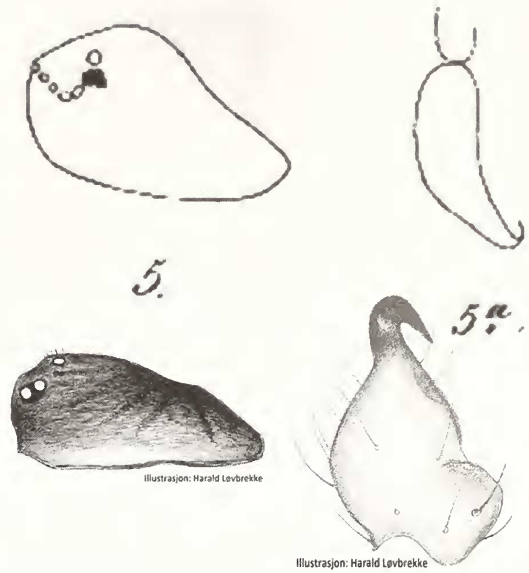


Fig. 3: Comparison of the illustrations of *Tapinocyba bilacunata* (L. Koch, 1881) in the original description (above, "5" and "5a") and the corresponding illustrations (below) of *Silometopus incurvatus* (O. P.-Cambridge, 1873). Despite their highly schematic nature, the figures in combination with the detailed description and locality data allow a provisional identification of the species. (Illustration of modern material from Norway, courtesy of Harald Løvbrekke)

reported from Germany, but there are records from northeast Poland (Kupryjanowicz 1997b), about 500 km from the type locality of *T. bilacunata*, in addition to the main distribution centre in northern Sweden, southern Finland and the Murmansk region of Russia (Holm 1977, Palmgren 1976, Tanasevitch 2007). Closer study of the distribution and relationship of the two forms, including re-examination of German and Polish material of *S. incurvatus* from inland and coastal localities, and especially from the type locality of *T. bilacunata*, could therefore lead to a reassessment of the assumed synonymy.

Theridion kollari Doleschall, 1852 = **nomen dubium**
(Theridiidae)

The type of this species is lost, but Thaler & Gruber (2003) found the original illustrations by Doleschall (iconotypes) in the archives of the Naturhistorisches Museum Wien. Based on these figures they suggested identification as *Enoplognatha* sp. However, the figure and description would also be compatible with *Steatoda bipunctata* (Linnaeus, 1758), which Doleschall mentioned as a close relative. An unambiguous identification is in any case impossible.

Theridion varians melanotum Strand, 1907 = *Theridion varians* Hahn, 1833 **syn. nov.** (**Theridiidae**)

As this form was only mentioned as variety of a common species, no type was designated, and no relevant material could be traced in NSMW. Nevertheless, the short description clarifies without doubt that this form is not a subspecies in the modern sense, but merely refers to the common dark colour variant of this highly variable species.

Thomisus trigonus Giebel, 1869 = *Pistius truncatus* (Pallas, 1772) **syn. nov.** (**Thomisidae**)

Possible type material of this species is still preserved in Giebel's collection in the Zoological Collections of the Martin Luther University Halle, Germany. The vial with the material contains three specimens of *P. truncatus* (Schneider pers. comm.; Fig. 4), the species that was already considered as closely related in the original description (Giebel 1869: 367-368), which was based on a single female close to oviposition.



Fig. 4: Specimens of *Thomisus trigonus* in Giebel's collection in Halle, possibly including the original type (Photograph courtesy of Joachim Händel)

Walckenaeria menzei Bösenberg, 1902 = **nomen dubium** (**Linyphiidae**)

Although this species is most likely a junior synonym of *Walckenaeria nudipalpis* (Westring, 1851), a reliable identification based on the crude illustrations and vague description seems impossible (Braun 1982), especially when considering that similar species (e.g., *Walckenaeria obtusa* Blackwall, 1836) occur in the same area. The type material is in all probability lost.

Xysticus boesenbergi Charitonov, 1928 = **nomen dubium** (**Thomisidae**)

The name *X. boesenbergi* was suggested as a replacement name for *X. concinnus* Bösenberg, 1902 (not *X. concinnus* Kroneberg, 1875). The type material is presumably lost (Braun 1960). Based on the brief description, it is not even possible to identify the genus of the specimen, and Braun (1982) suggests that the type was a subadult female.

Xysticus paniscus L. Koch, 1875 = *Xysticus lineatus* (Westring, 1851) **syn. conf.** – **syn. nov.** in Jantscher (2001) (**Thomisidae**)

The type material of this species, kept in the Museum für Naturkunde in Berlin, was studied by Elke Jantscher for her revision of the genus *Xysticus* in Central Europe (Jantscher 2001) and unambiguously identified as belonging to *X. lineatus*.

Conclusion

The list of “phantom spiders” discussed in this paper is far from complete. Based on an initial count it seems likely that at least 5% of the taxa listed for Europe will turn out to be nomina dubia or synonyms of common species. Additional cases are documented on the Wiki page of the project and require further analysis of the type material. Most of the examined species so far have come from the German-speaking countries of Central Europe, and information on missing cases from other areas would be very welcome. We encourage the broader community of arachnologists to join the project and to help cleaning up the taxonomic and faunistic records.

Acknowledgements

We thank the members of the AraGes Spider Forum, in particular Jörg Pageler (Oldenburg), for stimulating discussions and encouragement. The following curators checked the collections in their care for possible type

material of phantom spiders and provided helpful information: Jan Beccaloni (Natural History Museum, London), Jason Dunlop (Museum für Naturkunde, Berlin), Fritz Geller-Grimm (Museum Wiesbaden Naturhistorische Sammlungen), Ambros Hänggi (Naturhistorisches Museum Basel), Peter Jäger and Julia Altmann (Senckenberg Museum Frankfurt), Torbjörn Kronestedt (Naturhistoriska riksmuseet Stockholm), Dominika Mierzwa-Szymkowiak (Zoological Museum, Warsaw), Karla Schneider (Zoologische Sammlung der Martin-Luther-Universität, Halle), Kai Schütte (Zoologisches Museum Hamburg), and Zoë Simmons (Oxford University Museum). We also thank Elke Jantscher (Graz) for permission to use information from her unpublished PhD thesis, Harald Lövbrekke (Sandnes) for the illustrations of *Silometopus incurvatus*, Joachim Händel (Zoologische Sammlung der Martin-Luther-Universität, Halle) for photos of the presumable type of *Thomisus trigonus*, and Stefan Rehfeldt (Berlin) for photographs and additional information on his specimen of "*Philodromus depriesteri*".

References

- Albert R 1979 Artenbestand und faunistische Verwandtschaft von Spinnengesellschaften (Araneae) im Hochsolling. – Jahresbericht des Naturwissenschaftlichen Vereins Wuppertal 32: 59–66
- Albrecht H 1995 Stammeklektorfänge von Spinnen (Araneae) in Laubwaldgesellschaften des ehemaligen Militärgeländes ‚Hohe Schreck-Finne‘ (Nordthüringen). – Veröffentlichungen des Naturkundemuseums Erfurt 14: 67–79
- Baehr B 1988 Die Bedeutung der Araneae für die Naturschutzpraxis, dargestellt am Beispiel von Erhebungen im Landkreis Weißenburg-Gunzenhausen (Mittelfranken). – Schriftenreihe des Bayerischen Landesamts für Umweltschutz 83: 43–59
- Bauchhens E 2009 Beiträge zur Taxonomie von *Anyphaena furva* Miller, 1967. – Contributions to Natural History 12: 153–159
- Bauchhens E, Dehler W & Scholl G 1987 Bodenspinnen aus dem Raum Veldensteiner Forst (Naturpark „Fränkische Schweiz/Veldensteiner Forst“). – Berichte der Naturwissenschaftlichen Gesellschaft Bayreuth 19: 7–44
- Bertkau P 1880 Verzeichniss der bisher bei Bonn beobachteten Spinnen. – Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westfalens 37: 215–343, Taf. VI
- Blanke R 1982 Untersuchungen zur Taxonomie der Gattung *Araniella* (Araneae, Araneidae). – Zoologica Scripta 11: 287–305 – doi: 10.1111/j.1463-6409.1982.tb00540.x
- Blick T & Scheidler M 1991 Kommentierte Artenliste der Spinnen Bayerns (Araneae). – Arachnologische Mitteilungen 1: 27–80 – doi: 10.5431/aramit0103
- Bonnet P 1955 Bibliographia araneorum. Tome 2(1). Dou-ladoure, Toulouse . pp. 1–918
- Bonnet P 1958 Bibliographia araneorum. Tome 2(4). Dou-ladoure, Toulouse. pp. 3027–4230
- Bösenberg W 1899 Die Spinnen der Rheinprovinz. – Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westfalens 56: 69–131; Taf. I
- Bösenberg W 1902 Die Spinnen Deutschlands. II–IV. – Zoologica (Stuttgart) 14: 97–384, Taf. IX–XXXVI – doi: 10.5962/bhl.title.6508
- Bösenberg W 1903 Die Spinnen Deutschlands. V, VI. – Zoologica (Stuttgart) 14: 385–465, Taf. XXXVII–XLIII – doi: 10.5962/bhl.title.6508
- Braun D 1992 Aspekte der Vertikalverteilung von Spinnen (Araneae) an Kiefernstämmen. – Arachnologische Mitteilungen 4: 1–20 – doi: 10.5431/aramit0401
- Braun R 1960 Neues zur Spinnenfauna des Rhein-Main-Gebietes und der Rheinpfalz. – Verhandlungen des nassauischen Vereins für Naturkunde 95: 28–89
- Braun R 1965 Beitrag zu einer Revision der paläarktischen Arten der *Philodromus aureolus*-Gruppe (Arach., Araneae). I. Morphologisch-systematischer Teil. – Senckenbergiana biologica 46: 368–428
- Braun R 1969 Zur Autökologie und Phänologie der Spinnen (Araneida) des Naturschutzgebietes „Mainzer Sand“. Gleichzeitig ein Beitrag zur Kenntnis der Thermophilie bei Spinnen. – Mainzer Naturwissenschaftliches Archiv 8: 193–289
- Braun R 1982 Deutung der angeblich neuen ‚Deutschland‘-Arten Bösenbergs und ihrer balkanischen ‚Wiederfunde‘ (Arachnida: Araneida). – Senckenbergiana biologica 62: 355–384
- Bryja V, Svatoň J, Chytil J, Majkus Z, Růžička V, Kasal P, Dolanský J, Buchar J, Chvátalová I, Řezáč M, Kubcová L, Erhart J & Fenclová I 2005 Spiders (Araneae) of the Lower Morava Biosphere Reserve and closely adjacent localities (Czech Republic). – Acta Musei Moraviae, Scientiae biologicae 90: 13–184
- Buchar J & Thaler K 1993 Die Arten der Gattung *Acantholycosa* in Westeuropa (Arachnida, Araneida: Lycosidae). – Revue suisse de zoologie 100: 327–341
- Bunn DS 1957 Colour changes in *Araneus quadratus* Clerck (Araneae: Argiopidae). – The Entomologist’s monthly magazine 93: 201
- Charitonov DE 1928 Опыт каталога русских пауков (автореферат) [Опыт каталога русских пауков, автореферат]. – Известия Биологического Научно Исследовательского Института при Пермском Университета [Известия Биологического научно-Исследовательского Института при Пермском Университета] 6: 55–56
- De Koninck H 2006 Spinnenbemonsteringen in hoogveen. – Nieuwsbrief van de Belgische arachnologische Vereniging 21: 13–22
- Drensky P 1929 Паяци (Araneae) от Централна и Югозападна Македония. Spinnen aus Mittel- und Südwest-Mazedonien. – Списание на Българската академия на науките [Spisanie na Bŭlgarskata Akademia na Naukite] 39: 1–76, Taf. I–IV
- Drensky P 1936 Опись на паяцитѣ отъ Балканския полуостровъ. Katalog der echten Spinnen (Araneae) der

- Balkanhalbinsel. – Сборник на Българската академия на науките [Sbornik na Bŭlgarskata Akademia na Naukite] 32(2): 1-223
- Emerton JH 1884 New England spiders of the family Epeiridae. – Transactions of the Connecticut Academy of Arts and Sciences 6: 295-342
- Esyunin SL 2006 Фауна пауков (Aranei) ксерофитных местообитаний [Fauna paukov (Aranei) kserofitnykh mestoobitaniy]. In: Антропогенная динамика природной среды [Antropogennaya dinamika prirodnoy sredy]. Том. II. Perm University, Perm. pp. 33-38
- Fickert C 1876 Verzeichniss der schlesischen Spinnen. – Zeitschrift für Entomologie, Breslau (N. F.) 5: 46-76
- Finch O-D 1997 Die Spinnen (Araneae) der Trockenrasen eines nordwestdeutschen Binnendünenkomplexes. – Drosera 97: 21-40
- Förster A & Bertkau P 1883 Beiträge zur Kenntniss der Spinnenfauna der Rheinprovinz. – Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westfalens 40: 205-278, Taf. III
- Franganillo BP 1913 Arácnidos de Asturias y Galicia. – Brotéria, Serie Zoologica 11: 119-133
- Franz H & Beier M 1948 Zur Kenntnis der Bodenfauna in pannonischen Klimagebiet Österreichs. II. Die Arthropoden. – Annalen des Naturhistorischen Museums in Wien 56: 440-549
- Gajdoš P & Majzlan O 2005 Pavúky (Araneae) pieskov v okolí Malaciek a Lakšárskej Novej Vsi – Spiders (Araneae) on sands in the surroundings of Malacky and Lakšárska Nová Ves. – Naturae Tutela 9:173-182
- Gallé R & Fehér B 2006 Edge effect on spider assemblages. – Tiscia 35: 37-40
- Gétaz A 1889 Notes araneologique sur le Pays-d'Enhaut. – Bulletin de la Société Vaudoise des Sciences Naturelles 25: 60-64 – doi: 10.5169/seals-262153
- Giebel CG 1869 *Thomisus trigonus*, neue Spinne der Halleschen Fauna. – Zeitschrift für die Gesamten Naturwissenschaften 33: 367-368
- Grimm U 1985 Die Gnaphosidae Mitteleuropas (Arachnida, Araneae). – Abhandlungen des Naturwissenschaftlichen Vereins in Hamburg N.F. 26: 1-18
- Harvey PR, Nellist DR & Telfer MG 2002 Provisional atlas of British spiders (Arachnida, Araneae), Volumes 1 & 2. Biological Records Centre, Huntingdon. 406 pp.
- Hauge E & Hansen LO 1991 Spiders (Araneae) from six small islands in the middle Oslofjord, SE Norway. – Fauna Norvegica B 38: 45-52
- Hęciak S 1983[circa] Revision of the genus *Phlegra* (Araneae: Salticidae). Dissertation, Poznań University. 308 pp.
- Heimer S & Nentwig W 1991 Spinnen Mitteleuropas. Ein Bestimmungsbuch. Paul Parey, Berlin & Hamburg. 543 pp.
- Helsdingen PJ van 2004 International biodiversity initiatives, with special emphasis on Fauna Europaea. In: Samu F & Szinetár C (eds.) European Arachnology 2002: 215-219
- Helsdingen PJ van 2008 *Linyphia triumphalis*, a junior synonym of *Centromerus pabulator* (Araneae, Linyphiidae). – Arachnologische Mitteilungen 36: 35-36 – doi: 10.5431/aramit3606
- Helsdingen van PJ 2015 Araneae. In: Fauna Europaea Database, Version 2014. – Internet: <http://www.european-arachnology.org/reports/fauna.shtml> (30 March 2015) [see also http://www.faunaeur.org/full_results.php?id=10626] Hermann E 1998 Die Spinnen (Araneae) ausgewählter Halbtrockenrasen im Osten Luxemburgs. – Bulletin de la Société des naturalistes luxembourgeois 99: 189-199
- Holm Å 1977 Two new species of the erigonine genera *Savignia* and *Silometopus* (Araneae: Linyphiidae) from Swedish Lapland. – Entomologica Scandinavica 8: 161-166 – doi: 10.1163/187631277X00224
- Hula V, Niedobova J & Šefrova H 2014 Remarkable spiders of artificial sandy grassland near town Hodonín (Czech Republic). – Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis 62(1): 99-115. – doi: 10.11118/actaun201462010099
- Hull JE 1932 Nomenclature of British linyphiid spiders: A brief examination of Simon's French catalogue. – Transactions of the Northern Naturalists' Union 1: 104-110
- Hull JE 1955 British spiders: recent and amended records. – Annals and Magazine of Natural History (12)8: 49-56 – doi: 10.1080/00222935508651823
- Jakobitz J & Broen B von 2001 Die Spinnenfauna des NSG Pimpinellenberg. – Naturschutz und Landschaftspflege in Brandenburg 10(2): 71-80
- Jantscher E 2001 Revision der Krabbenspinnengattung *Xysticus* C. L. Koch, 1835 (Araneae, Thomisidae) in Zentraleuropa. Dissertation, Univ. Graz. 328 pp, 81 Taf. [Summary in Entomologica Austriaca 2002(7): 13]
- Klomp H & Teerink BJ 1973 The density of the invertebrate summer fauna on the crowns of pine trees, *Pinus sylvestris*, in the central part of the Netherlands. – Beiträge zur Entomologie 23: 325-344
- Koch CL 1846 Die Arachniden. Vierzehnter Band (1/2). J. L. Lotzbeck, Nürnberg. pp. 1-88, Tab. CCCCLXIX-CCCCLXXX – doi: 10.5962/bhl.title.43744
- Koch L 1867 Die Arachniden-Familie der Drassiden. Heft 7. Nürnberg. pp. 305-352, Tab. XIII-XIV
- Koch L 1870 Beiträge zur Kenntniss der Arachnidenfauna Galiziens. – Jahrbuch der Kaiserlich-Königlichen Gelehrten Gesellschaft in Krakau 41: 1-56
- Koch L 1875 Beschreibungen einiger von Herrn Dr Zimmermann bei Niesky in der Oberlausitz und im Riesengebirge entdeckter neuer Spinnenarten. – Abhandlungen der Naturforschenden Gesellschaft Görlitz 15: 1-21, Taf. 1
- Koch L 1881 Beschreibungen neuer von Herrn Dr Zimmermann bei Niesky in der Oberlausitz entdeckter Arachniden. – Abhandlungen der Naturforschenden Gesellschaft Görlitz 17: 41-71, Taf. II
- Kostanjšek R & Kuntner M 2015 Araneae Sloveniae: a national spider species checklist. – ZooKeys 474: 1-91 – doi: 10.3897/zookeys.474.8474

- Kraus O 2009 Female spider genitalia, systematics and phylogeny (Arachnida: Araneae). – Contributions to Natural History 12: 781-793
- Kronstedt T 2000 *Erigone angustata* Westring, 1874: a long-surviving junior synonym of *Agynera conigera* (O. P.-Cambridge, 1863). – Newsletter of the British Arachnological Society 89: 4
- Kronstedt T 2010 *Titanoeca psammophila* – alvarstenspindel. – Internet: http://www.artfakta.se/artfaktablad/Titanoeca_Psammophila_101910.pdf (14 April 2015)
- Książkówna IH 1936 Charakterystyka ekologicznych zespołów pająków w lasach Pogórza Cieszyńskiego. – Wydawnictwa Śląskie (Prace biologiczne) 1: 131-161
- Kulczyński W 1898 Symbola ad faunam araneorum Austriae inferioris cognoscendam. – Rozprawy Akademii Umiejętności Wydziału Matematyczno-Przyrodniczego 36: 1-114
- Kupryjanowicz J 1997a *Titanoeca psammophila* Wunderlich, 1993 in Poland (Araneae: Titanoecidae). – Bulletin of the Polish Academy of Sciences. Series Biological Sciences 44: 57-60
- Kupryjanowicz J 1997b Spiders of the Biebrza National Park – species new and rare to Poland. – Proceedings of the 16th European Colloquium of Arachnology, Siedlce. 183-194
- Lebert H 1877 Die Spinnen der Schweiz, ihr Bau, ihr Leben, ihre systematische Übersicht. – Neue Denkschriften der Schweizerischen Naturforschenden Gesellschaft 27: 1-321, Taf. I-VI
- Lemke M, Merches E & Hänggi A 2014 Neue Arbeitsgruppe der Arachnologischen Gesellschaft (AraGes) mit Erweiterung der Webpräsenz: Arachniden-Wiki und -Forum. – Arachnologische Mitteilungen 48: viii-ix
- Lessert R de 1910 Araignées. – Catalogue des Invertébrés de la Suisse 3: 1-635
- Lockett GH, Millidge AF & Merrett P 1974 British spiders, Volume III. Ray Society, London. 315 pp.
- Malicky H 1972 Spinnenfunde aus dem Burgenland und aus Niederösterreich (Araneae). – Wissenschaftliche Arbeiten aus dem Burgenland 48: 101-108
- Martin D 2013 Aberrante Epigynenbildungen bei der Wolfspinne *Pardosa palustris* (Araneae, Lycosidae). – Arachnologische Mitteilungen 46: 1-5 – doi: 10.5431/aramit4601
- Meyer M 2014 New record of a parasitoid worm (Mermithidae, Nematoda) in a spider of the genus *Trochosa* (Lycosidae). – Arachnologische Mitteilungen 48: 13-15 – doi: 10.5431/aramit4803
- Merkens S 1999 Die Spinnenzönosen der Sandtrockenrasen im norddeutschen Tiefland im West-Ost-Transsekt – Gemeinschaftsstruktur, Habitatbindung, Biogeographie: Dissertation Univ. Osnabrück. 165 pp.
- Miller F 1967 Studien über die Kopulationsorgane der Spinnengattung *Zelotes*, *Micaria*, *Robertus* und *Dipoena* nebst Beschreibung einiger neuen oder unvollkommen bekannten Spinnenarten. – Přírodovědné práce ústavu Československé Akademie Věd v Brně (N.S.) 1: 251-298
- Miller F 1971 Pavouci – Araneida. – Klíč zvířeny ČSSR 4: 51-306
- Millidge AF 1993 Further remarks on the taxonomy and relationships of the Linyphiidae, based on the epigynal duct confirmations and other characters (Araneae). – Bulletin of the British Arachnological Society 9: 145-156
- Muster C & Thaler K 2004 New species and records of Mediterranean Philodromidae (Arachnida, Araneae). – Denisia 12: 305-326
- Nentwig W, Blick T, Gloor D, Hänggi A & Kropf C 2015 araneae – Spiders of Europe. Version 03.2015. – Internet: <http://www.araneae.unibe.ch> (30 March 2015)
- Otto S & Floren A 2007 The spider fauna (Araneae) of tree canopies in the Białowieża Forest. – Fragmenta Faunistica 50: 57-70
- Palmgren P 1976 Die Spinnenfauna Finnlands und Ostfennoskandiens VII. Linyphiidae 2 (Micyrphantinae, mit Ausnahme der Linyphiinae-ähnlichen). – Fauna Fennica 29: 1-126
- Penney D & Bennett SP 2006 First unequivocal mermithid-linyphiid (Araneae) parasite-host association. – Journal of Arachnology 34: 273-278 – doi: 10.1636/S04-92.1
- Peus F 1928 Beiträge zur Kenntnis der Tierwelt nordwestdeutscher Hochmoore. Eine ökologische Studie. Insekten, Spinnentiere (teilw.), Wirbeltiere. – Zeitschrift für Morphologie und Ökologie der Tiere 12: 533-683 – doi: 10.1007/BF00403122
- Pickard-Cambridge AW 1918 Memoir of the Reverend Octavius Pickard-Cambridge M.A. F.R.S. Private circulation, Oxford. 96 pp. – doi: 10.5962/bhl.title.32016
- Prószyński J & Starega W 1971 Pająki - Aranei. – Katalog fauny Polski 33: 1-382
- Punda H 1975 Pająki borów sosnowych. Polska Akademia Nauk, Warsaw. 91 pp.
- Ratschker U, Meier J & Wetzel A 2005 Die Zönose der Araneae in Kiefern- und Birkenforsten rekultivierter Tagebaukippen in Sachsen und Brandenburg. – Arachnologische Mitteilungen 29: 3-16 – doi: 10.5431/aramit2902
- Reimoser E 1937 Spinnentiere oder Arachnoidea. VIII. Gnaphosidae oder Plattbauchspinnen. Anyphaenidae oder Zartspinnen. Clubionidae oder Röhrenspinnen. – Die Tierwelt Deutschlands 33: 1-99
- Renner F 1988 Liste der im Krieg vernichteten Typen des Königlichen Naturalienkabinetts in Stuttgart. In: Haupt J (ed.) XI. Europäisches Arachnologisches Colloquium, Berlin. pp. 319-329
- Roberts MJ 1987 The spiders of Great Britain and Ireland, Volume 2: Linyphiidae and check list. Harley Books, Colchester. 204 pp.
- Roberts MJ 1998 Spinnengids. Tirion, Baarn (Netherlands). 397 pp.
- Roewer CF 1928 Araneae, Echte oder Webespinnen. – Die Tierwelt Mitteleuropas 3(6): 1-144
- Russell-Smith A 2011 Identification of *Entelecara acuminata* and *Entelecara congenera*. – Newsletter of the British Arachnological Society 121: 20-21

- Savory TH 1961 Spiders, men and scorpions: being the history of arachnology. University of London. 191 pp.
- Schenkel E 1925 Spinnen der Salzstellen von Oldesloe. – Mitteilungen der Geographischen Gesellschaft in Lübeck 30: 143-147
- Schmidt L & Melber A 2004 Einfluss des Heidemanagements auf die Wirbellosenfauna in Sand- und Mooren Nordwestdeutschlands. – NNA-Berichte 17: 145-164
- Schultz W 1992 Beitrag zur Spinnenfauna (Arachnida, Araneida) der Teriärdünen der ostfriesischen Insel Norderney. – Verhandlungen des naturwissenschaftlichen Vereins Hamburg (NF) 33: 239-245
- Simon E 1864 Histoire naturelle des araignées (Aranéides). Roret, Paris. 540 pp. – doi: 10.5962/bhl.title.47654
- Simon E 1868 Monographie des espèces européennes de la famille des Attides (Attidae Sundewall. – Saltigradae Latreille.). – Annales de la Société Entomologique de France (4)8: 11-72, 529-726
- Simon E 1875 Les arachnides de France. Tome II. Roret, Paris. 350 pp., Planche IV-VII
- Simon E 1929 Les arachnides de France. Tome VI. Synopsis générale et catalogue des espèces françaises de l'ordre des Araneae, 3e partie. Roret, Paris. pp. 533-772
- Simon E 1932 Les arachnides de France. Tome VI. Synopsis générale et catalogue des espèces françaises de l'ordre des Araneae, 4e partie. Roret, Paris. pp. 773-978
- Simon E 1937 Les arachnides de France. Tome VI. Synopsis générale et catalogue des espèces françaises de l'ordre des Araneae, 5e et dernière partie. Roret, Paris. pp. 979-1298
- Staudt A 2015 Nachweiskarten der Spinnentiere Deutschlands (Arachnida: Araneae, Opiliones, Pseudoscorpiones). – Internet: <http://www.spiderling.de/arages> (28 March 2015)
- Staudt A, Weber D & Nährig D 2012 Webspinnen (Arachnida, Araneae) aus Höhlen des Grossherzogtums Luxemburgs. – Ferrantia 69: 115-157
- Sterghiu C 1985 Arachnida. Fam. Clubionidae. – Fauna Republicii Socialiste România, Arachnida V, Fascicula 4: 1-168
- Strand E 1907a Spinnen des zoologischen Instituts in Tübingen. – Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere 24: 391-468
- Strand E 1907b Verzeichnis der bis jetzt bei Marburg von Prof. Dr. H. Zimmermann aufgefundenen Spinnenarten. – Zoologischer Anzeiger 32: 216-243
- Strand E 1910 Bemerkungen über einige Arachniden aus württembergischen und fränkischen Höhlen. – Archiv für Naturgeschichte 76(I, 2): 44-52
- Strand E 1942 Miscellanea nomenclatorica zoologica et palaeontologica. X. – Folia Zoologica et Hydrobiologica, Rigā 11: 386-402
- Sundevall CJ 1831 Svenska Spindlarnes Beskrifning. Fortsättning. P. A. Norstedt & Söner, Stockholm. 41 pp.
- Sundevall CJ 1833 Conspectus Arachnidum. Berling, Londini Gothorum [Lund]. 39 pp.
- Svatoň J & Pridavka R 2000 Spiders (Araneae) of the peatbog national nature reserve Švihrovské rašelinisko (Slovakia). – Ekológia (Bratislava) 19, Supplement 4: 97-104
- Taczanowski W 1866 Spis pajaków zebranych w okolicach Warszawy w ciągu roku 1865. – Wykaz Szkoły Głownej Warszawskiego 5: 1-14
- Tanasevitch AV 2007 New records of linyphiid spiders from Russia, with taxonomic and nomenclatural notes (Aranei: Linyphiidae). – Arthropoda Selecta 16: 115-135
- Thorell T 1871 Remarks on synonyms of European spiders. Part II. Lundström, Uppsala. pp 97-228 – doi: 10.5962/bhl.title.69282
- Tutelaers P 2000 Spinnen uit Cranendonck. – Nieuwsbrief SPINED 15: 5-21
- Van Keer K & Van Keer J 2005 The spiders (Araneae) of Antwerp inner city: faunistics and some reflections on ecology. – Nieuwsbrief van de Belgische arachnologische Vereniging 20: 81-90
- Westring N 1861 Araneae svecicae. – Göteborgs Kungliga Vetenskaps och Vitterhets Samhälles Handlingar 7: 1-615
- World Spider Catalog 2015 World Spider Catalog, version 16.5. Natural History Museum Bern. – Internet: <http://wsc.nmbe.ch> (27 July 2015)
- Wunderlich J 1973 Zur Spinnenfauna Deutschlands, XV. Weitere seltene und bisher unbekannte Arten sowie Anmerkungen zur Taxonomie und Synonymie (Arachnida: Araneae). – Senckenbergiana biologica 54: 405-428
- Wunderlich J 2008 Differing views of the taxonomy of spiders (Araneae) and on spiders' intraspecific variability. – Beiträge zur Araneologie 5: 756-781
- Wunderlich J 2011 Extant and fossil spiders (Araneae). – Beiträge zur Araneologie 6: 1-640